What is claimed is:

- 1. A device for converting between electrical energy and mechanical energy, the device comprising:
- an electroactive polymer capable of converting between electrical energy and mechanical energy; and

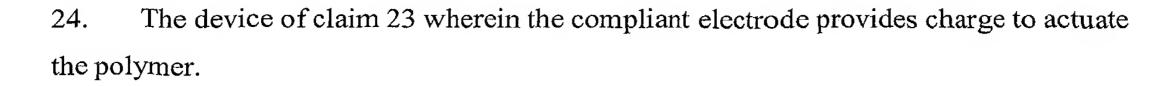
at least two electrodes in electrical communication with the electroactive polymer,

wherein one of the at least two electrodes is a non-contact electrode, having a portion proximate to the electroactive polymer, that transfers charge to or from a portion of the polymer through a non-condensed medium without contacting the polymer.

- 2. The device of claim 1 wherein the medium comprises one of air, a gas, a liquid, and a supercritical fluid.
- 3. The device of claim 1 wherein the medium is a vacuum.
- 4. The device of claim 3 further comprising a seal between the polymer and the vacuum.
- 5. The device of claim 1 wherein the non-contact electrode comprises a charge source that transmits charge
- 6. The device of claim 5 wherein the charge source transmits charge directly to a surface of the polymer.
- 7. The device of claim 5 wherein the charge source generates charge having a voltage between about 10 volts and about 100 volts.
 - 8. The device of claim 7 further comprising a bias voltage source or electric field source that raises the voltage difference of the opposite sides of the polymer to a value greater than that used to generate the charge.
- 25 9. The device of claim 5 wherein the charge source comprises a field emitter.

- 10. The device of claim 9 wherein the charge source comprises a microfabricated field emitter.
- 11. The device of claim 5 wherein the portion of the non-contact electrode proximate to the electroactive polymer comprises a sharp tipped metal.
- 5 12. The device of claim 11 wherein the sharp tipped metal is a Spindt cathode.
 - 13. The device of claim 1 wherein the charge comprises an ion.
 - 14. The device of claim 13 wherein the ion is positive.
 - 15. The device of claim 1 wherein the non-contact electrode receives the charge from the polymer.
 - 16. The device of claim 1 wherein the charge comprises an electron.
 - 17. The device of claim 1 wherein the polymer is a monolithic electroactive polymer.
 - 18. The device of claim 1 further comprising an array of pins that direct the flow of charge between the non-contact electrode and one or more active areas on the electroactive polymer.
 - 19. The device of claim 1 wherein the distance between the non-contact electrode and the portion of the electroactive polymer is less than about 5 centimeters.
 - 20. The device of claim 19 wherein the distance between the non-contact electrode and the portion of the electroactive polymer is between about 0.5 millimeters and about 5 millimeters.
- 20 21. The device of claim 1 further comprising a high voltage source that provide a voltage greater than 100 volts in electrical communication with the non-contact electrode.
 - 22. The device of claim 1 wherein the electroactive polymer is a dielectric elastomer.
 - 23. The device of claim 1 wherein a second electrode of the at least two electrodes is a compliant electrode attached to the polymer.

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- 25. The device of claim 23 wherein the polymer is arranged in a manner which causes a portion of the polymer to deflect in response to a change in electric field and/or arranged in a manner which causes a change in electric field in response to deflection of the polymer.
- 26. The device of claim 1 further comprising a region of high conductivity, operably coupled to the polymer, that receives charge from the non-contact electrode and a region of low conductivity operably coupled to the polymer.
- 27. A method for operating an electroactive polymer in electrical communication with at least two electrodes, wherein one of the at least two electrodes is a non-contact electrode, having a portion proximate to the electroactive polymer without contacting the polymer, the method comprising transferring charge between the non-contact electrode and a portion of the polymer through a non-condensed medium to thereby operate the electroactive polymer.
- 28. The method of claim 27 wherein transferring the charge comprises generating the charge at a first voltage.
- 29. The method of claim 28 further comprising raising energy of the charge with a bias voltage.
- 20 30. The method of claim 27 wherein the charge is transferred from the non-contact electrode to the polymer.
 - 31. The method of claim 30 wherein the charge is used to cancel opposite charge supplied by a contact electrode attached to the polymer.
- 32. The method of claim 27 wherein the medium comprises one of air, an ionized gas, and an inert gas.
 - 33. The method of claim 27 wherein the medium is a vacuum.
 - 34. The method of claim 27 wherein the charge comprises an ion. SRI1P044/US-4390-2/JKW/WJP

- 35. The method of claim 34 wherein the ion is positive.
- 36. The method of claim 27 wherein the non-contact electrode receives the charge from the polymer.
- 37. The method of claim 27 wherein the charge comprises an electron.
- The method of claim 27 further comprising directing the flow of charge between the non-contact electrode and the portion of the electroactive polymer using an array of pins.
 - 39. A device for converting between electrical energy and mechanical energy, the device comprising:

an electroactive polymer capable of converting between electrical energy and mechanical energy; and

at least two electrodes in electrical communication with the electroactive polymer,

wherein one of the at least two electrodes is a non-contact electrode, having a portion proximate to the electroactive polymer, that transfers charge to or from a portion of the polymer through air without contacting the polymer.